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SOVIET PENTODE OSCILLATOR

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Development of "all-pentode" transmitters followed close upon the heels of the so-called "all-pentode" receivers. They are characterized by small dimensions, but with increased power and good performance. Soviet industry now produces all types of pentodes of low and medium power that can be easily used in amateur short-wave transmitters. The pentode is a contemporary universal tube which can be used in all stages of a transmitter. It has three grids with separate leads to the sockets. By connecting one or the other or all of the grids with the plate or cathode, it is possible to obtain great variations in the tube characteristics, and to convert the pentode into either a tetrode or triode. The pentode can be easily used in electron-coupled oscillator circuit. Beam-type oscillator tubes are variations of oscillator pentodes.

Nomenclature and Data for Pentode Oscillators

Soviet industry produces oscillator pentodes with power output ranging from 20 watts to one kilowatt. The following table gives some of the basic characteristics of low and medium-power oscillator pentodes.

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Basic Data of Oscillator Pentodes

Digitized by srujanika@gmail.com

Basic Data

Llate Current
Llate Current

Screen Grid Dispersion

Plate Two

Suppressor Grid
Total Page

Maximum Operating Frequency

| | V | A | m/A | % | W | 44% | Hours | V | V | V | V | mA/V | - | N |
|-------|-------|------------|-----|-----|------|-------|-------|----------|-----|----|-----|------|-----|---------|
| -411 | 10/20 | 0.6/0.3 | 120 | 20 | ? | 0.3 | 1000 | 400 | 250 | 30 | -50 | 5.5 | 7.5 | 20 |
| -412 | 10/20 | 0.45/0.225 | 100 | 20 | 4 | 0.1 | 1000 | 750 | 250 | 40 | -50 | 3.8 | 14 | 20 |
| -413 | 10/20 | 1.0/0.5 | 120 | 40 | 6 | 0.2 | 1000 | 750 | 250 | 40 | -40 | 5.0 | 12 | 40 |
| -414 | 10/20 | 3/1.5 | 930 | 100 | 14 | 0.2 | 1000 | 750/1500 | 350 | 40 | -60 | 6.0 | 10 | 100/150 |
| -415 | 5 | 0.85 | 150 | 20 | 2.5 | 0.175 | 1000 | 400 | 225 | 35 | -50 | 4.5 | 8 | 20 |
| -416 | 20 | 3 | 750 | 125 | 20 | 0.15 | 1000 | 1500 | 400 | 50 | 80 | 4.2 | 5 | 250 |
| -4171 | 20 | 150 | 150 | 20 | 0.17 | 2000 | 1500 | 400 | 50 | 80 | 4.5 | 5.5 | 300 | 20 |

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G-411. Used in the amplifier stage and the master oscillator, at frequencies above 50 megacycles. It has low-operating plate voltage (400 volts). When used in the amplifier circuit it dissipates 0.2 watts. The tube has a heater-type oxide cathode with a center tap. The plate is connected to the top cap, while the control grid lead is taken out at the side. The socket has eight points. In circuits where the cathode and the heater have different potentials, the voltage between the two must not exceed 100 volts. The G-411 can be used in place of beam tetrodes, like the 6F3 and the 6L6. Dimensions are 140 x 52 millimeters.

G-412. Used in power-amplifier stages at frequencies above 25 megacycles. It can be used to replace the G-411 pentode. It has a heater-type oxide cathode with a center tap. The plate is connected to the top cap while the control grid lead is taken out at the side. The socket has eight points. Dimensions are 140 x 50 millimeters.

G-413. Used in power-amplifier stages and doubler stages at frequencies below 20 megacycles. It has twice as much oscillator power output, with same construction and socket connections as the G-411 and G-412. Because the filaments are long, it is recommended that a blocking condenser with a capacity of 1,000 to 5,000 $\mu\mu$ F be installed between the ends of the filament and the center tap. Dimensions are 170 x 64 millimeters.

G-414. Used in power-amplifier stages and doubler stages at frequencies below 25 megacycles. It can be used with a plate voltage of 750 volts, and under forced operations with a voltage of 1,500 volts. The construction is the same as the G-413 except that it has a special socket. Dimensions are 220 x 65 millimeters.

G-418. Used in various stages of low and medium power transmitters. It is similar in general to the G-411, but varies in that it has a 5-volt direct current filament. The G-418 can be considered obsolete. Dimensions are 145 x 64 millimeters.

G-440 (G-471). Used in output stages of fairly high-power transmitters at frequencies not above 20 megacycles. Direct current carbide cathode with a center tap. The plate is connected to the top cap, while the control grid is attached to the No 4 point of the socket. Dimensions are 210 x 65 millimeters.

G-440 A. Similar to the G-440 (G-471) in its use and construction. It has a greater power output, however, because control grid lead is taken out at the side. This tube will not be manufactured any more.

All the mentioned pentodes have blackened plates, thus producing better radiation. With reference to the heater-type oxide cathodes it must be mentioned that it is necessary to preheat the cathode, and that the anode must be heated uninterruptedly. It is recommended that the bias voltage be applied to the control grid simultaneously with the filament supply. Only after this, is it possible to supply positive voltage to the plate and the screen grid, and if necessary to the suppressor grid.

Beam tetrodes 6F3, 6L6, 6L6S are frequently used in amateur transmitters. Portable transmitters, operating on direct current, use small-size pentodes such as the SO-257 (oscillator output, 2 watts), the SB-244, the SB-258 (oscillator output, 0.2 - 0.5 watts) and the tetrode SB-245 (oscillator output, 2 watts).

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